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# Knowledge, attitudes and practice of preconception care among women attending a university tertiary hospital in Riyadh: Cross sectional study

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## ABSTRACT

**Introduction:** Pregnancy in reproductive age is associated with many threats. Preconception care has since been implemented to encourage wellbeing during conception and enhance pregnancy-related outcomes. The purpose of this research was to evaluate the degree of awareness, behaviors and activities relevant to preconception care among women attending prenatal care appointments. **Methodology:** A cross-sectional analysis undertaken at King Saud University Medical City from April to December 2020. A questionnaire was administered to 1135 respondents aged 18 to 45 years. The questionnaire consisted of four areas, evaluating socio-demographic data and awareness, perceptions and experience of preconception. **Results:** The mean (SD) behaviors, practice and awareness scores were [11.37(3.94%), 15.39 (2.12%)/ and 10.13(2.30%)] respectively. Overall, 98.5 per cent of respondents had positive perceptions, 45.2 per cent had good methods and 51.9 per cent had good understanding of preconception treatment. **Conclusion:** The majority of women had moderate awareness and a neutral approach to preconception treatment. Educational intervention focused on a wellbeing belief paradigm is also suggested in order to enhance women's education and perceptions and establish preconception habits in these persons.

**Keywords:** Awareness, Mindset, Experience, Preconception, Reproductive era

## 1. INTRODUCTION

Preconception care (PCC) is defined according to the WHO as the provision of biomedical, behavioral and social health interventions to women and couples before conception occurs. It is an important and fundamental part of the women and child's health as it aims to promote their wellbeing in short and long term and to control disease occurrence during their lives (Temel et al., 2015; Alshammari et al., 2020). Also, "PCC is defined as the set of preventive interventions targeted at women of reproductive age and their partners to

improve pregnancy outcomes". This aspect of health care is extremely essential especially in high-parity societies as Saudi Arabia. One of the important factors that prevent couples from reaching preconception care (PCC) and was identified as obstacle to apply the PCC is lack of knowledge. It plays a major role on the couples and the future generation as they found that every couples attending PCC were found to have at least one risk factor that might affect the pregnancy and it is susceptible to prevention (Nohr et al., 2014).

Pregnancy outcomes and fetal growth are affected by multiple factors, one important protective factor and easy to be introduced is the preconception use of multivitamins and folic acid. Recently, multivitamins are shown to have a positive impact on the pregnancy outcomes, as it has been shown to lessen the risks of preeclampsia, IUGR, preterm birth, placental dysfunction and late fetal death. However, Folic acid supplementation is recommended to be taken preconception ally and early during the pregnancy as it was proved to be effective in preventing NTD (Tort et al., 2013). Knowledge regarding folic acid supplementation and multivitamins use in the preconception period were assessed in a large population-based study for the years 2007, 2009 and 2014. Their findings were the following; Knowledge regarding FA increased from 30.7 % in 2007 to 36.8 % in 2009 ( $p=0.001$ ), with no further increase in 2010. They assessed the characteristics of women taking preconception folic acid supplementation and multivitamins (Derouiche et al., 2020). Knowledge is seen more in females, who aged between 25-44 years, their educational level is moderate or high, their income is high, employed who lives with children and non-religious participants. Knowledge was significantly lower in men, persons aged between 16 and 24 years or 45 years and older, in persons with a non-Western immigrant background, in minimum and minimum-moderate income households, and in households without children.

Here we aim to assess Saudi women's' knowledge regarding preconception care and to identify their characteristics, to assess Saudi women's' attitude and behavior towards preconception care and to determine the barriers that could prevent Saudi women from reaching preconception care.

## 2. METHODS

### Study Design

It is a quantitative, observational cross-sectional design. The study will assess the knowledge of Saudi women regarding preconception care in KSUMC and their characteristics. It will also assess their attitudes and behaviors towards preconception care. Additionally, it will determine the most significant barriers and obstacles that prevent Saudi women from reaching preconception care.

### Study Setting and population

An anonymous self-administered paper based questionnaire will be distributed to all Saudi females visiting King Saud University Medical City outpatient clinics, aged between 18-45 years. The data will be collected from April to December, 2020.

### Sampling Size and technique

The sample size required = 1135.  $n$  = sample size,  $Z$  = level of confidence (2 sided 95% confidence interval = 1.96),  $P$  = proportion to be estimated = precision (5%)

### Data collection Method

The Data will be collected by self-administered free access paper-based questionnaires, which will be distributed among Saudi females visiting King Saud University Medical City outpatient clinics. The questionnaire is composed of four main sections.

It contains six close-ended questions, which includes these attributes, age, Nationality, marital status, educational level, and income and employment status. Then, the second section is about previous pregnancies and deliveries. It contains five close-ended questions and one multiple choice question. The close-ended questions are asking about the following; if the participant has any chronic illnesses, if her previous pregnancy was planned, if she used any birth control method or assisted reproductive technology, if she is having children. The multiple choices question was about experiencing one or more of the following perinatal morbidities; preterm delivery, baby weight less than 2.5 kg, baby who is having congenital anomalies, baby who admitted to NICU or baby with low Apgar (Hasan et al., 2009).

The third section is regarding preconception care which is divided into two main branches which rated as: strongly disagree, disagree, neither agree nor disagree, agree, strongly agree. the first branch is about women attitude towards Preconception Care includes the following, 1) PCC before pregnancy is unnecessary, (2) PCC should be free of charge for everyone planning to conceive, (3) if you visit PCC, you know how to become pregnant in a healthy manner, (4) If I have access to free PCC counselling

before pregnancy, I would definitely go, (5) if I have access to PCC counselling before pregnancy and it costs < 55 SR, I would definitely go, (6) If I have to quit smoking and/or drinking before pregnancy, I would definitely quit, (7) If I have access to PCC every month before pregnancy for advice and a free test, I would definitely go, (8) If I have to take daily folic-acid before pregnancy, I would definitely do it. The second branch is about Women's social-influences regarding seeking advice for attending PCC which contains (1) My husband's opinion is important to me, (2) My family's opinion is important to me, (3) My friends' opinion are important to me, (4) I am afraid of social negative reactions if I have a baby with health problems (Hasan et al., 2009).

The fourth section is discussing two main objectives. The first one is about women's expectations towards their own belief in the ability to perform the demanded behavior successfully before pregnancy. The response is rated as: very difficult, difficult, easy, very easy, and not applicable. It is asking about the following; (1) if you have overweight, how difficult is it to lose weight? (2) If you smoke, how difficult is it to quit? (3) If you drink alcohol, how difficult is it to quit? (4) How difficult is it to take folic-acid daily? And also (5) how difficult is it to attend PCC regularly (e.g. once per month) to seek advice or get information.

The second one is a true and false question about women's knowledge of risk factors for a healthy pregnancy which includes; (1) pregnancies close behind each other are good for baby's health, (2) smoking adversely affects fertility, (3) being underweight or overweight adversely affects fertility, (4) sexually transmitted disease must be treated before pregnancy, (5) all medications from drugstores are safe and can be used during pregnancy, and (6) the best moment to start with folic-acid supplementation is when you got pregnant.

The last section is asking about the Barriers and Obstacles which prevent Saudi women from reaching preconception care and the response rated as strongly disagree, disagree, neutral, agree, strongly agree. it contains the following statements (1) I am afraid to attend PCC if blood is withdrawn, (2) PCC takes too much time and effort, (3) I am reluctant regarding PCC, (4) PCC is useless, (5) if I attend PCC I feel pressured to have a perfect baby, (6) I'm afraid of negative reactions from my husband or family. The questionnaire was produced in a variety of phases. The first stage required a literature quest on the awareness, behaviors and experience of preconception. This search was undertaken to establish the relevant substance of the questionnaire and the sub-domains of information, mindset and experience. After a literature scan, a questionnaire was chosen for the components of information and experience (8). This questionnaire was selected because it was produced in the Arabic language and was suitable for a community survey. In addition, the questionnaire was checked with a Cronbach alpha of 0.79. Permission was received from the author via e-mail. As regards the attitude aspect, the quality of the questions was decided by a panel of experts, consisting of two family medicine specialists and a statistician.

The questionnaire was self-assessed. It consisted of four domains: socio-demographic evidence, information, attitudes and experience. The first segment of the questionnaire deals with socio-demographic features. The Information Domain consisted of 21 objects with a three-point Likert scale (Yes/No/Not sure). The "1" score was given for accurate responses, and the "0" score was incorrect and not sure. The questions raised concerned awareness of high-risk pregnancies, birth spacing and the consequences of inadequate spacing, anaemia, folic acid, adverse effects of smoking and balanced diets during pregnancy. The area of practice consisted of 16 objects. A score of "1" was provided for successful practice and "0" for bad practice. The questions posed were about medical check-ups, balanced foods and healthy habits. Both scores were measured and summarized for each area of experience and practice. The overall score was converted into a statistic by dividing the score by the highest score available and multiplying the score by 100.

A new questionnaire was created for the attitude portion of the community experts composed of two family medicine experts and a statistician. The area of attitude consisted of four objects. The questions questioned the respondents regarding their views and expectations of the value and advantages of pre-conception treatment and the form of facilities used to receive pre-conception care guidance. A 5-point Likert scale has been used. Scores of "1," "2," "3," "4" and "5" were used for strong conflict, disagreement, compromise, agreement and strong cooperation, respectively. Both scores have been summed up. The overall score was converted into a percentage by dividing the score by the highest score possible and multiplying the corresponding score by 100. The authenticity of the face was tested by 10 pregnant people; these women were not considered as part of the sample size. Finally, a couple of the questionnaire sentences have been changed.

Categorical responses (good/poor) were then developed for information, attitudes and practice domains. The rating was based on the percentage of the overall score for each domain: 0.0 percent – 49.9 percent was bad, and 50 percent – 100 percent was fine. For each domain, the researchers determined that the respondents had to achieve at least a 50% mark for their awareness, attitude and practice to be deemed to be successful. Those who ranked fewer than 50% in each domain are deemed to have low awareness, pessimistic attitudes and poor practices. The same definitions were included in the analysis conducted.

A pilot research was performed at the Obstetrics and Gynecology clinic, during prenatal visits by pregnant women, to assess the reliability and validity of the questionnaire and to measure the time needed to complete the questionnaire. A total of 30 participants

replied to the questionnaire. Item review, including estimates of internal accuracy reliability, was conducted using Cronbach's alpha and corrected item-total correlations to determine construct validity. Problematic objects have been deleted. The attitude portion initially consisted of five questions, but was reduced to four after the removal of a troublesome object. The findings were acceptable, displaying a Cronbach alpha of 0.8. The final questionnaire composed of 21 awareness objects, 16 practice items and 4 attitudes items.

### Data Collection Procedure

Pregnant people who attended their appointment at the clinic were approached using comfort sampling. They were told about the research protocol and were encouraged to engage in the analysis by qualifying respondents who met the inclusion and exclusion requirements. The self-governing questionnaire was conducted and the respondents were directed to address the questionnaire. The respondents had to finish the questionnaire and return it to the researcher on the same day. Respondents were told that the information given was confidential and that they could withdraw from the analysis if they desired.

### Ethical Consideration

The thesis analysis was accepted by the Committee on Ethics, King Saud University Medical City, King Khalid University Hospital, Riyadh, Saudi Arabia, Approval Number 23/893-64#KSUMC/IRB

- 1) The confidentiality and anonymity of all study participants will be assured by giving a code number to each one of them for the purpose of data analysis only.
- 2) The participation in the study is going to be voluntary.
- 3) No rewards will be given to the participants.
- 4) The identity of the participants will be protected if the research is published.

### Statistical analysis

Data were analyzed by using SPSS 22. Continuous variables were expressed as Median or mean  $\pm$  standard deviation and categorical variables were expressed as percentages. Linear regression was used. A p-value  $<0.05$  was considered statistically significant. Cronbach's alpha coefficient was utilized to assess the internal consistency of the tools. In this regard, the internal consistency of the knowledge questionnaire and was confirmed ( $r=0.68$ ). The reliability of the health belief model questionnaire was estimated at  $r=0.93$  (perceived sensitivity [ $r=0.92$ ], perceived severity [ $r=0.85$ ], perceived benefits [ $r=0.93$ ], and perceived barriers [ $r=0.89$ ]). The questionnaires were completed by women through self-report. The mean scores of knowledge  $<50\%$ ,  $50-70\%$ , and  $>75\%$  were weak, moderate, and good, respectively. In addition, the mean score of constructs from -1 to 2 were considered weak, whereas the scores of -1 to +1 and above +1 were neutral and good, respectively (Table 1).

**Table 1** Reliability of the dimensions of the questionnaire

Dimension	Cronbach's Alpha
Attitude towards PCC	0.574
Social influences regarding PCC	0.585
Self-efficacy to attend PCC	0.749
Knowledge of risk factors for a healthy pregnancy (skills)	0.307
Barriers regarding PCC	0.732

## 3. RESULTS

In particular, 1135 women visited the KSUMC Clinic for appointment during the study time. Among the participants, people who attended the appointment were tested for eligibility; 10 women were not qualified, as three were health professionals and seven declined to enter the research. As a result, 1135 women decided to participate and completed the report, with a response rate of 100 per cent. The bulk of respondents were Arabs (99.3 percent). Their age ranged from 18–45 years, with an average age of 28.8 years. Some of the women have been working (83 percent). The bulk of respondents (72.6%) had expected pregnancy. The bulk of these women (80 per cent) did not encounter problems linked to pregnancy during the research. Just 6.7% of them have a history of medical conditions (Table 2).

**Table 2** Characteristics of the participants

Characteristics of the participants		Number (%)	
Age ( Mean , SD )		31.48	(8.80)
Marital status	Single	63	(16.32)
	Married	308	(79.79)
	Divorced	12	(3.11)
	Widow	3	(0.78)
Nationality	Saudi	386	(100.0)
	elementary	12	(3.11)
	intermediate	15	(3.89)
Education level	secondary	97	(25.13)
	high education	262	(67.88)
	< 4000 SR	128	(33.16)
Income	4000-10000 SR	162	(41.97)
	> 10000SR	96	(24.87)
	Employed	120	(31.09)
Employment	Unemployed	266	(68.91)
	Yes	65	(16.84)
Chronic Diseases	No	321	(83.16)
	No	109	(28.24)
	Not applicable	15	(3.89)
Planned previous pregnancy	Not previously pregnant	98	(25.39)
	Yes	164	(42.49)
	Yes	183	(47.41)
Birth control	No	146	(37.82)
	Not applicable	57	(14.77)
	Yes	28	(7.25)
Used Assisted Pregnancy	No	300	(77.72)
	Not applicable	58	(15.03)
	Yes	235	(60.88)
Have children	No	95	(24.61)
	Not applicable	56	(14.51)
	Yes	51	(13.21)
Preterm birth (<37 weeks of gestation)	No	212	(54.92)
	Not applicable	123	(31.87)
	Yes	54	(13.99)
Low birth weight (<2,500 g)	No	209	(54.15)
	Not applicable	123	(31.87)
	Yes	12	(3.11)
Congenital anomalies	No	251	(65.03)
	Not applicable	123	(31.87)
	Yes	18	(4.66)
Low Apgar	No	245	(63.47)
	Not applicable	123	(31.87)
	Yes	26	(6.74)
Admission to NICU	No	237	(61.40)
	Not applicable	123	(31.87)
Total		386	(100)

The mean awareness level was 11.37 (3.94), with 51.9 per cent of respondents possessing clear knowledge of preconception treatment. The mean scores for the mentality and practice elements were 15.39 (2.12) and 10.13 (2.30) respectively. In Table (3), 98.5 percent of respondents have positive perceptions about pre-conception treatment, and 45.2 percent had good pre-conception care procedures. (Figure 1) Information of the respondents' answers to the information, attitude and experience domains is seen in Tables 4, 5 and 6 respectively.

**Table 3** Attitudes, social influences, self-efficacy, knowledge of risk factors, barriers regarding PCC and intention to use PCC (n = 386)

Attitudes, social influences, self-efficacy, and knowledge	N	%
Attitude towards PCC (median; range)	11	(3 – 15)
Social influences regarding PCC		
Husband is important	295	(88.3)
Family is important	248	(80.8)
Friends are important	103	(39.2)
Being afraid for negative reactions	78	(23.5)
Self-efficacy to attend PCCa	18	(5 – 25)
Knowledge of risk factors for a healthy pregnancy (skills) median; range)	5	(1 – 6)
Barriers regarding PCC <sup>b</sup>		
Fear for blood withdrawal	36	(9.9)
Time and effort	113	(38.6)
Reluctance to PCC	12	(3.3)
Preconception care is useless	14	(3.9)
Feeling pressured to have a perfect baby	80	(25.3)
Being afraid of negative reactions	20	(5.5)
Forbidden by religion	9	(2.4)
Intention to use PCC (median; range)	23	(9 – 25)

PCC = preconception care

a: A higher score represents larger degree of self-efficacy

b: A higher score represents more barriers

**Table 4** linear regression analysis of the intention to attend PCC

Associated factors	$\beta$	95% CI		P value
		Lower Bound	Upper Bound	
Age	0.02	-0.03	0.08	0.387
Attitude level towards desired behavior	0.30	0.10	0.50	0.003*
Self-efficacy level towards desired behavior	0.12	0.00	0.23	0.049*
Knowledge level of perinatal risk factors	0.01	-0.36	0.39	0.946
Barriers level	-0.17	-0.27	-0.07	0.001*
Marital status (reference: unmarried)				
married	0.21	-1.48	1.91	0.803

Educational level (reference: high education)				
elementary	-1.40	-3.59	0.79	0.210
intermediate	0.79	-1.13	2.71	0.415
secondary	-0.17	-1.18	0.85	0.745
Income (reference: > 10000SR )				
< 4000 SR	0.06	-1.01	1.13	0.913
4000-10000 SR	0.51	-0.46	1.47	0.303
Employed (reference: Unemployed )	-0.17	-1.10	0.75	0.712
Chronic Diseases	1.05	0.11	1.99	0.029*
Planned previous preg(reference: Yes )				
No	0.06	-0.82	0.95	0.887
Not applicable	-1.57	-4.11	0.96	0.222
Not previously pregnant	0.39	-1.21	2.00	0.631
Birth control (reference: Not applicable)				
Yes	3.27	-2.02	8.56	0.224
No	3.14	-2.13	8.40	0.242
Used Assisted Pregnancy	-0.57	-1.87	0.72	0.384
Have children(reference: Not applicable)				
Yes	-4.00	-9.22	1.23	0.133
No	-3.64	-8.72	1.44	0.159
Social influences towards desired behavior (not importance)				
Husband	1.00	-0.29	2.28	0.129
Family	0.42	-0.68	1.51	0.453
Friend	-0.79	-1.62	0.05	0.065
Being afraid for negative reactions	-0.41	-1.30	0.47	0.359
* Significant p value				

Table 5 showed the evaluation of the correlation between knowledge and health belief model constructs using Spearman's correlation coefficient demonstrated that knowledge had a significant and direct relationship with perceived sensitivity ( $P=0.001$ ,  $r=0.309$ ), perceived severity ( $P<0.001$ ,  $r_s=0.342$ ), perceived benefits ( $P=0.002$ ,  $r_s=0.287$ ), and perceived barriers ( $P=0.043$ ,  $r_s=0.193$ ). The correlation between attitude and constructs of health belief model using Spearman correlation coefficient showed that the components of health model (perceived sensitivity, perceived severity, perceived benefits, and perceived barriers) had a significant relationship with women's attitude toward preconception care ( $P<0.001$ ). In this regard, perceived sensitivity had the highest relationship with attitude score ( $P=0.001$  and  $r_s=0.733$ ), and subsequently the perceived benefits ( $P<0.001$  and  $r_s=0.691$ ) and perceived barriers ( $P<0.001$  and  $r_s=0.643$ ) had the highest correlation with the attitude score (Table 6).

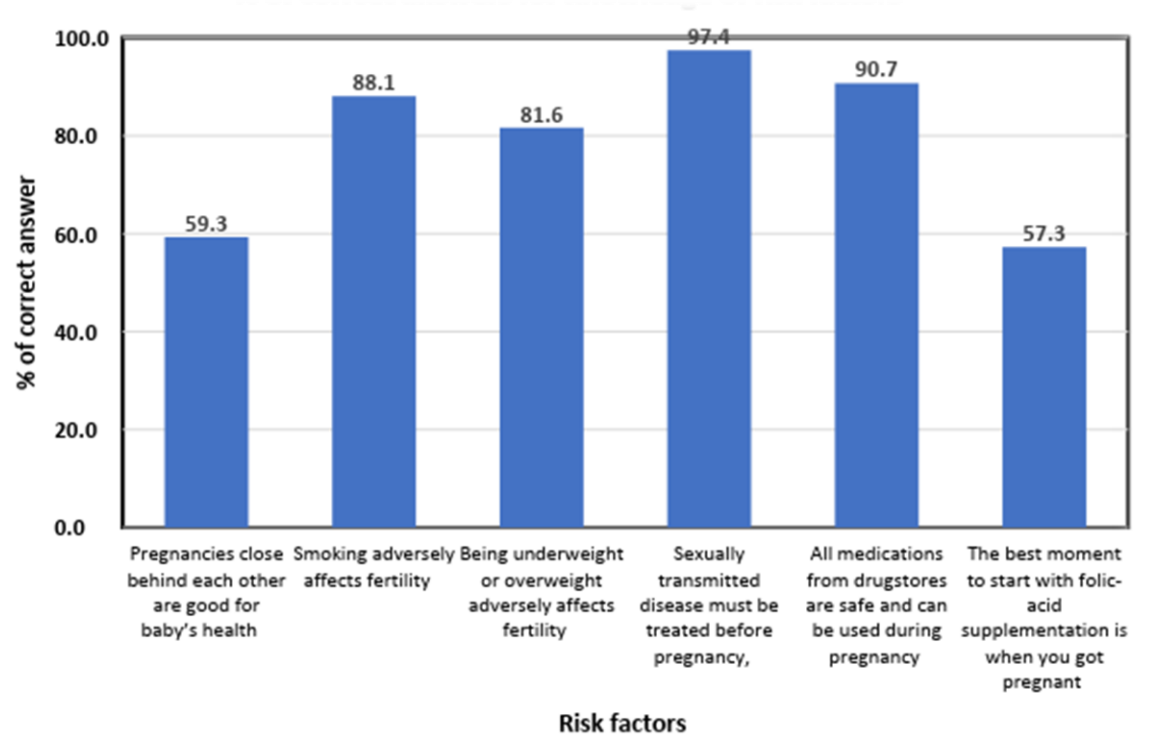
**Table 5** Mean and standard deviation of knowledge, as well as perceived attitude, sensitivity, severity, and benefits of women toward preconception care

	Mean $\pm$ standard deviation	Weak N (%)	Moderate N (%)	Good N (%)	Neutral N (5)
Knowledge	11.01 $\pm$ 3.25	40 (36.4)	70 (63.6)	-	-
Attitude (total four structures)	46.97 $\pm$ 22.80	-	-	23 (20.9)	87 (79.1)
Perceived sensitivity	11.51 $\pm$ 10.79	2 (1.8)	-	20 (18.2)	88 (80)
Perceived severity	11.53 $\pm$ 7.50	-	-	25 (22.7)	85 (77.3)
Perceived benefits	20.45 $\pm$ 7.71	-	-	70 (63.3)	40 (36.7)
Perceived barriers	3.46 $\pm$ 7.34	1 (0.9)	-	34 (31.2)	75 (67.9)

**Table 6** Correlation of knowledge and attitude of women regarding preconception care with the constructs of perceived knowledge, sensitivity, severity, benefits and barriers

Variable	Knowledge	Perceived sensitivity	Perceived severity	Perceived benefits	Perceived barriers	Attitude total four constructs
Knowledge	1	$R_s=0.309$ $P=0.001^{**}$	$P<0.001^{***}$ $r_s=0.342$	$P=0.002^{**}$ $r_s=0.287$	$P=0.043^{*}$ $r_s=0.193$	$P<0.001^{***}$ $r_s=0.365$
Perceived sensitivity		1	$P=0.002^{**}$ $r_s=0.289$	$P<0.001^{**}$ $r_s=0.375$	$P=0.001^{***}$ $r_s=0.318$	$P<0.001^{***}$ $r_s=0.733$
Perceived severity			1	$P<0.001^{***}$ $r_s=0.415$	$P=0.007^{**}$ $r_s=0.255$	$P<0.001^{***}$ $r_s=0.614$
Perceived benefits				1	$P=0.008^{**}$ $r_s=0.253$	$P<0.001^{***}$ $r_s=0.691$
Perceived barriers					1	$P<0.001^{***}$ $r_s=0.643$

Pearson’s correlation coefficient= $r_s$ ,  $^{*}P<0.05$ ,  $^{**}P<0.01$ ,  $^{***}P<0.001$



**Figure 1** Percentage of correct answers for Knowledge of risk factors

4. DISCUSSION

Women aged between 25 and 44 years showed the highest level of correct knowledge. However, a recent study found a positive association between level of education and both knowledge and preconception FA supplementation. In households without children, less correct knowledge about preconception FA use was observed. We expect that persons with children are more informed about FA use because of their previous contact with a GP, midwife or gynecologists. And overall knowledge was low amongst the low SES group (Hasan et al., 2009). Similarly, a study done in France found that women who were on contraceptive methods or who had chronic disease or on fertility treatment were more frequently using FA supplements before the conception. Recommendation regarding Folic Acid (FA) supplements in France is to begin FA one month prior to the conception, at least. Many studies were done and confirmed that Folic Acid (FA) supplements would reduce the incidence of Neural Tube Defects by about 72%. Around 15% of women said they were taking FA supplements during their pregnancy although they were not able to assess the dose, duration and the compliance. Also they were not able to conclude that it was prescribed by a doctor or taken over the counter (Bodnar et al., 2006).

Recent review article published early in 2017 talking about preconception health behavior, knowledge and attitude included more than 90 studies. Two published studies one from Israel and the other from Switzerland, discussed the women's knowledge regarding folic acid supplementation during pregnancy, and they found that about 100% and 70% of women knew that folic acid is recommended during pregnancy but more than two thirds and 80% did not know it prevents NTDs, respectively. Four recent studies from USA were done regarding the PCH knowledge. One is assessing couples' awareness on PCH found that they understand its importance but not fully aware of it. Also, couples who are planning for conception are more seekers for PCH. They also suggest targeting couples for PCH more than individuals. Second one was done targeting men's knowledge found that almost all of them were aware of using drugs, medications or having infections preconception-ally would have an impact on the pregnancy, but using tobacco was only addressed by 15% only. The third was done comparing men's and women's knowledge and found that generally women are more aware of the importance of PCH behaviors. The fourth one was targeting low socioeconomic status women and found that almost all of them appreciate the importance of immunization, tobacco cessation and the adverse effects of passive smoking. But only 70% knew folic acid is beneficial. Knowledge also was affected by planning to conceive, planned pregnancies women are usually more aware of the importance of folate and the use of it in the preconception period. Moving to Italy, more than 90% of women recognized folic acid as an important supplement during pregnancy while smoking has negative outcomes. But only 60% were aware that alcohol is bad.

In Netherlands, a recent study found that knowledge on folic acid and intention to seek PCH increased from 2007-2009. Data from USA on Post-Partum Women regarding PCH found that only one third had PCC. Those were more likely to take multivitamins and be ceased of alcohol prior to conception but not of smoking. Women who received PCC in Australia had lesser preterm birth. They were more likely to take folic acid and to be vaccinated against influenza and hepatitis B, less likely to gain weight. Attending PCC did not affect the smoking or alcohol consumption (Catov et al., 2009).

Another study was done during 2008 to assess the multivitamins usage and early pregnancy loss. They found that multivitamins usage prior to and during pregnancy decrease the risk of miscarriage although the exact mechanism is not known (Catov et al., 2011). Similar results from Pittsburg were noticed, one study was established to assess the relation between multivitamins supplements during the preconception period and preeclampsia (Wilson et al., 2015). They found that multivitamins supplements during the preconception period reduced the risk of preeclampsia by 45% compared to non-users. This relation was seen only in women whom their BMI is less than 25 at the beginning of their pregnancy. However, this relation was not observed in overweight women (Van Beynum et al., 2009).

Moreover, one study from the Denmark is done to evaluate the risk reduction of preeclampsia and preconception use of multivitamins. They concluded that Regular use of multivitamins in the preconception duration and pregnancy showed modest decrease in the risk of preeclampsia in normal weight women (Crude hazard ratio= .83). While the usage of it had no effect on the risk of having a baby whose small for gestational age (SGA). On the other hand, the use of folic acid did not affect the risk of preeclampsia or SGA. These results were reported also in other studies (Ray et al., 2001). Similarly, one large study was done to assess the effect of multivitamins and preterm birth and SGA. They concluded that preconception usage of multivitamins decreased the risk of preterm birth in non-obese women and the risk of SGA irrespective of the weight (Temel et al., 2013). Serious congenital anomalies are estimated to be about 4-5% of all babies, of which about 2% can be diagnosed prenatally. However, folic acid supplementation is proved to be preventive for many anomalies as neural tube defect, congenital heart diseases, urinary tract malformation, oral facial clefts and limb defects. This was supported by a large study that took place in Netherlands and published during 2009; they found that women who were on folic acid during the preconception period had 20% reduction in the risk of congenital heart diseases (Spence et al., 2010).

Regarding the intention to seek preconception health care (PHC), a study was done to evaluate the intention to seek PHC for the years 2004, 2007 and 2009. They concluded that intention to seek PHC was higher in males, non-Western respondents, individuals with a low educational level, those with a minimum household income, unemployed respondents, respondents living in deprived neighborhoods and those living in households with children. Higher intention observed in low socioeconomic status. The intention to seek PCC increased from 16.1 % in 2007 to 24.6 % in 2012 ( $p < 0.001$ ), with a temporary decrease to 18.8 % in 2013 and an increase to 20.3 % in 2014 (Spence et al., 2010). Diabetic mothers are at risk of having babies with major renal or cardiac congenital malformations. Diabetic mothers who attended the PCC are at lower risk to deliver babies with congenital malformation than diabetic's non-attending the PCC. Also they were having lower glucose level in the first trimester and glycosylated hemoglobin than diabetic who did not attend the PCC. Only 20% of diabetic mothers were registered in the statewide California Diabetes and Pregnancy Program. Moreover not visiting the PCC was associated with lower socio-economic and educational level. The frequency of having unplanned pregnancy among the letter is also higher. Smoking cessation programs are part of the PCC. So, higher number of smoker mothers in the women who did not visit the PCC (Chacko et al., 2012).

One cross-sectional study was done on 2012 studying health behavior regarding preconception care from three different ethnicity groups at Netherlands. They found that adverse effect of smoking was not known in around 50% of women. Knowledge on folic acid was lower in immigrant women. Turkish and Moroccan women were more likely to be influenced by their family, friends and neighbors. Barriers perceived by women were mostly related to the time and effort. Immigrants think that PCC is beneficial while 50% of Dutch women think it is not. Moreover, the intention to seek PCC was much higher in immigrant women. Overall, the intention to seek PCC was lower in women not in a relationship, multiparous, previous adverse perinatal outcome, higher educational level, who had paid work and experienced more barriers. Their results were similar to another study designed to assess Turkish immigrants' intention to seek preconception screening for haemo-globino-pathies, they concluded that uncertainty was leading them to seek preconception care. Also, older age women tend to seek it more probably because of higher knowledge of perinatal risk factors (Chacko et al., 2012).

A cohort study from Denmark published in 2014 done to assess the effect of using folic acid and multivitamins on fetal death. They found that compared to non-multivitamins users, women in their first pregnancy, of younger age and have lower BMI were more likely to be on folic acid and multivitamins during pregnancy (Conde-Agudelo et al., 2012). Also, they were less likely to be smokers or of low social status. Their diet was healthy but they had more troubles with the nausea. Regarding fetal death, women who were on multivitamins had higher risk prior to their 20th weeks of gestation (12% increased crude risk of fetal death) but less risk afterward (Ribeiro & Milanez, 2011). Another study showed similar results of increased risk by 15%. Moreover, the risk was affected by the duration of multivitamins use as there was minimum increased in the risk of fetal death when the preconception use of multivitamins was longer [crude HRs 1.23 (0.93–1.61) and 1.32 (1.09–1.60) for 3–4 and 5–6 weeks, respectively; P-test for trend = 0.002]. Also, this was found in other study. Only women on regular use of multivitamins during the preconception period had increased risk of early fetal death (Seshadri et al., 2012).

In contrast, one observational study showed significant decreased in fetal loss ~ about 50% but the results might be affected by selection bias and recall confounders (Seshadri et al., 2012). On the other hand, the ones on folic acid did not show an increased or decreased risk either early or late during their pregnancy and the analysis for this group turned to be not accurate and the data was removed from the figures and the results (Chuang et al., 2011). The risk of late fetal loss, preterm birth, preeclampsia and being small for gestational age were less in multivitamins users. They also reported repeated miscarriages and fertility problems but the factors were accounted and results did not change accordingly. They suggest that the replication of the findings especially for lower socioeconomic status is needed, also, they lack the evidence and association between stillbirth and miscarriages and multivitamins users. It is of importance to mention that this study is not sufficient to establish any recommendation regarding multivitamins usage (Spence et al., 2010).

This research was undertaken in a homogenous population, the majority of who were Saudis. The findings are therefore not reflective of the Arabs, as Saudi Arabia is a multi-racial nation. Owing to the short length of the sample time, convenience sampling was utilized. This method of sampling has the capacity for bias in sampling. Sampling may have been improved if randomization had been carried out (Chacko et al., 2012).

## 5. CONCLUSION

According to the findings of this research, the knowledge of the plurality of women in preconception treatment was mild and the majority of women had a neutral outlook in this regard. It is also recommended that health education planners create preparation programs to be utilized by employers to enhance women's awareness and perceptions towards pre-conception treatment, as well as to take into consideration potential sensitivity, seriousness, advantages and obstacles. It is proposed that potential research be performed in various regions of Saudi Arabia in order to obtain more data and evaluate outcomes and design approaches.

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### Author Contributions

Dr. Yaser conceptualized and designed the study, drafted the initial manuscript, reviewed and revised the manuscript. Drs. Noor and Reem designed the data collection instruments, collected data, carried out the initial analyses, reviewed and revised the manuscript. Drs Noor, Reema conceptualized and designed the study, coordinated and supervised data collection, and critically

reviewed the manuscript for important intellectual content. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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### Conflict of Interest

The authors declare that there are no conflicts of interests.

### Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

### Ethical approval

The study was approved by the Medical Ethics Committee of King Saud University (ethical approval code: 23/893-64#KSUMC/IRB).

### Data and materials availability

All data associated with this study are present in the paper.

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